MS Cloud Managed Switches

Overview

The Cisco Meraki MS is the world's first cloud-managed switch, bringing the benefits of the cloud to enterprise networks: simplified management, reduced complexity, network wide visibility and control, and lower cost for branch and campus deployments.

Cisco Meraki access switching is available in two product lines — the MS220 and MS320 families. Mission-critical features — like deep, Layer 7 application visibility, virtual stacking, QoS for business critical applications, 802.1X access control, and more — are present in both families.

The MS320 is the flagship Meraki layer 3 access switch, designed for high-speed connectivity and high availability, with optional redundant power supplies. In addition, the MS320's full-PoE models are ideal for next generation 802.11ac wireless AP, including the Meraki MR34 — with plenty of budget to spare for other PoE clients.

The MS220 family provide layer 2 access switching, is ideal for deploying to branch locations, and supports an optional, rack-mountable remote PSU(1).

(1) Except MS220-8/P models.

A Fresh Approach

Meraki switches are built from the ground up to be easy to manage without compromising any of the power and flexibility traditionally found in enterprise-class switches.

Cisco Meraki switches are managed through an elegant, intuitive cloud interface, rather than a cryptic command line. To bring up a Meraki switch, just plug it in; there's no need for complicated configuration files — or pre-staging.

In addition, Meraki's centralized management system gives administrators deep visibility into the network and how it's used. See which switches are near capacity across hundreds of sites. Find all configuration changes made by a certain person with instant search.

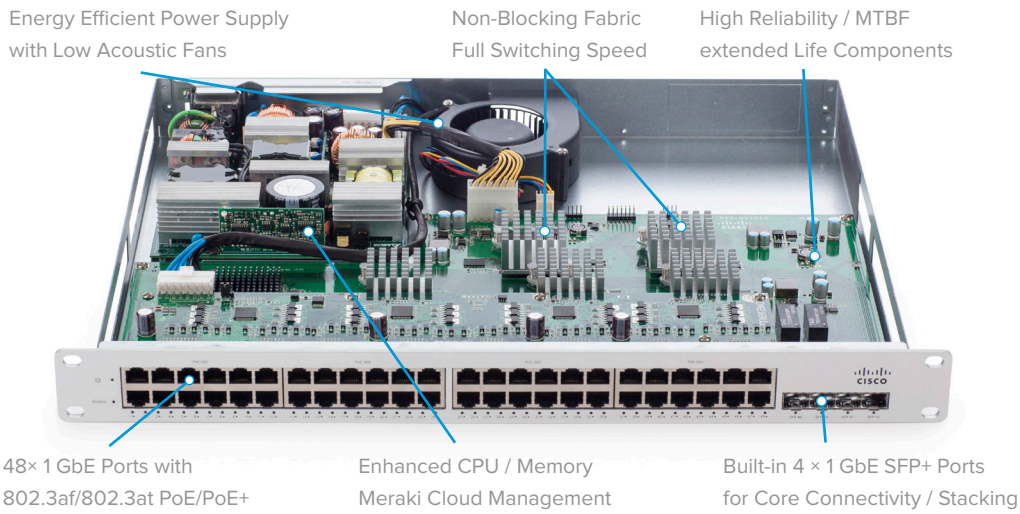
Industry-Leading Cloud Management

Cloud management has a number of benefits that make it easier to build networks large and small:

- Single pane of glass management of distributed switch deployments, wireless APs, and firewalls across multiple sites through the browser.
- Virtual stacking: manage up to tens of thousands of ports from a single pane of glass.
- Layer 7 OS, client, and hostname fingerprinting.
- Powerful Live Tools such as cable test to isolate physical layer issues.
- E-mail and SMS (text) alerts upon power loss, downtime, or configuration changes.[1]
- Role-based administration and automatic, scheduled firmware upgrades over the web.
- Regular feature updates and enhancements delivered on demand from the Meraki cloud.
- No staging deployments

Inside the Meraki MS

MS220-48LP shown, features vary by model



Enterprise-Class Hardware

Meraki switches feature high-end hardware without the high-end price, including:

- Four built-in small form-factor pluggable transceivers (SFP / SFP+), two transceivers for MS220-8/P
- GbE and 10 GbE uplink ports for high-speed connectivity to aggregation layer switches or other upstream devices
- Wire-speed switch fabric (up to 176 Gbps) and QoS queues per port for converged voice, video, and data deployments
- Low power consumption, quiet acoustic designs, and shallow rack depth, which enable flexible deployment in wiring closets as well as offices and classrooms
- Fanless design on select models
- Up to 740 watt PoE budget with PoE+ support for powering APs, phones, cameras, and other PoE enabled devices (124W for MS220-8/P)
- Lifetime hardware warranty and advanced replacement at no additional cost
- Field-replaceable, hot-swappable power supplies and RPS option for mission-critical applications

Full Enterprise Feature Set

Meraki switches include all of the traditional Ethernet features found on the highest end products, including:

- Quality-of-Service (QoS) to prioritize mission critical traffic such as voice and video
- IEEE 802.1X support for port based network access control
- MAC-based RADIUS auth and MAC whitelisting
- Voice VLAN support for simplified VoIP deployments
- Port Mirroring to monitor network traffic
- DHCP snooping to prevent users from adding unauthorized DHCP servers on the network
- IGMP Snooping to optimize network performance with multicast traffic
- Link Aggregation Control Protocol (LACP) for high-capacity trunking, stacking, and increased availability
- Broadcast storm protection, spanning tree, BPDU guard, root guard, and other safeguards to guard against misconfigurations and reduce convergence time
- Per port VLAN configuration
- Multiple administrative roles with sophisticated security policy management
- Layer 3 on MS320 series extends routing down to the network edge

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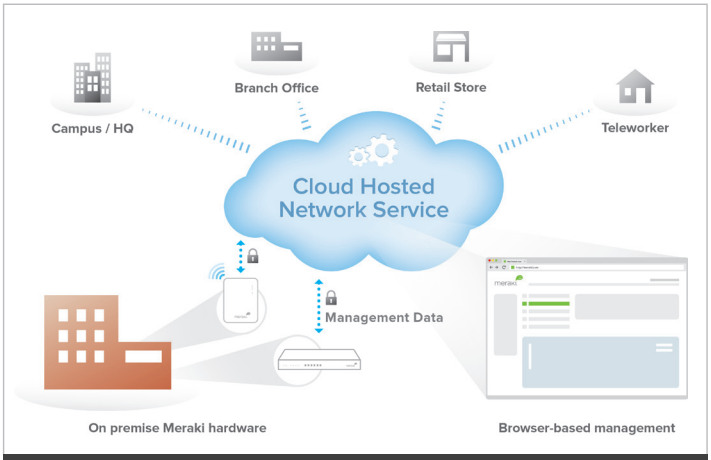
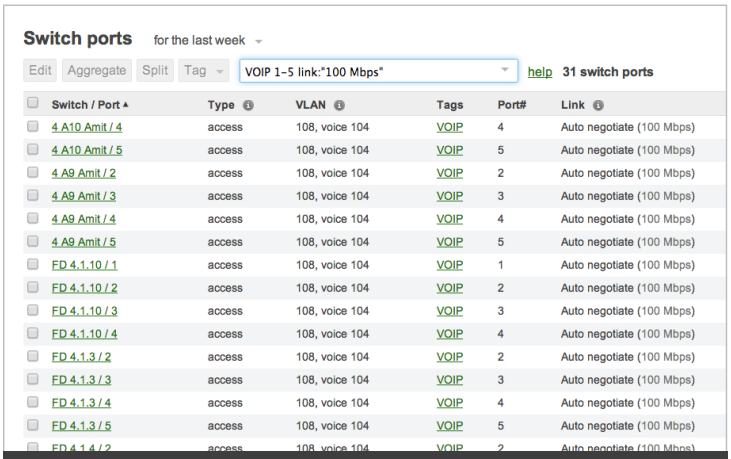


Meraki Cloud Management Architecture


Switch ports
for the last week
Edit
Aggregate
Split
Tag
VOIP 1-5 link:"100 Mbps"
help
31 switch ports
Switch / Port
Type
VLAN
Tags
Port#
Link
4 A10 Amit / 4 access 108, voice 104 VOIP 4 Auto negotiate (100 Mbps)
4 A10 Amit / 5 access 108, voice 104 VOIP 5 Auto negotiate (100 Mbps)
4 A9 Amit / 2 access 108, voice 104 VOIP 2 Auto negotiate (100 Mbps)
4 A9 Amit / 3 access 108, voice 104 VOIP 3 Auto negotiate (100 Mbps)
4 A9 Amit / 4 access 108, voice 104 VOIP 4 Auto negotiate (100 Mbps)
4 A9 Amit / 5 access 108, voice 104 VOIP 5 Auto negotiate (100 Mbps)
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FD 4.1.10 / 2 access 108, voice 104 VOIP 2 Auto negotiate (100 Mbps)
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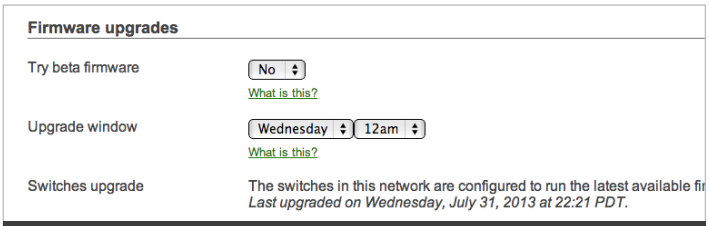
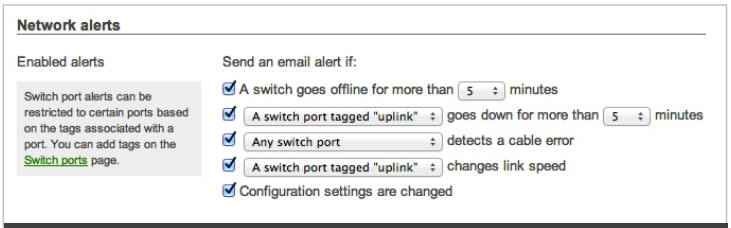
FD 4.1.3 / 4 access 108, voice 104 VOIP 4 Auto negotiate (100 Mbps)
FD 4.1.3 / 5 access 108, voice 104 VOIP 5 Auto negotiate (100 Mbps)

Combined Views of Thousands of Ports



Scheduled Firmware Updates


Network alerts
Enabled alerts
Switch port alerts can be restricted to certain ports based on the tags associated with a port. You can add tags on the Switch ports page.
Send an email alert if:
A switch goes offline for more than 5 minutes
A switch port tagged "uplink" goes down for more than 5 minutes
Any switch port detects a cable error
A switch port tagged "uplink" changes link speed
Configuration settings are changed

Automatic E-mail Alerts

Simplified Management and Operations

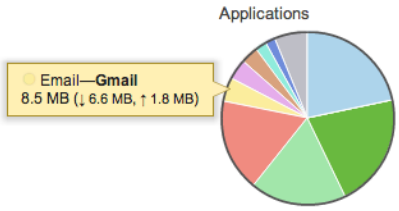
Meraki's cloud managed architecture makes it simpler than ever to quickly provision and reconfigure switch ports with security, QoS, and other parameters. The Meraki dashboard provides unified policies, event logs, and monitoring, which make it easy to manage and grow large network deployments.

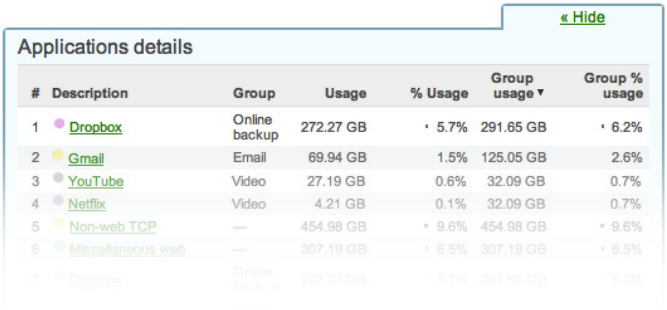
By providing a complete, powerful set of management functions over the web, Meraki's cloud-based management eliminates the need for proprietary command line configuration interfaces which require expensive and time consuming certifications. Meraki MS switches can be fully deployed and provisioned in minutes, without requiring any local configuration or staging. Additional or replacement switches can be sent to remote offices and installed by non-technical staff, saving thousands of dollars in time and travel expenses.

The Meraki MS family also includes several remote diagnostic features, from network connectivity and cable integrity tests to latency measurement tools. For deep client troubleshooting, administrators can even perform per-port remote pcap packet captures without any additional probes or hardware on site.

Layer 7 Visibility

Meraki is the only switch to include integrated Layer 7 fingerprinting. Identify hundreds of applications from business apps to BitTorrent and YouTube. User fingerprinting with Google-like search allows administrators to easily identify and control individual users, PCs, iMacs, iPads, Androids, and other devices. This unprecedented visibility allows you to optimize network resources and maintain optimal network performance.




« Hide
Applications details
Description Group Usage % Usage Group usage Group % usage
1 Dropbox Online backup 272.27 GB 5.7% 291.65 GB 6.2%
2 Gmail Email 69.94 GB 1.5% 125.05 GB 2.6%
3 YouTube Video 27.19 GB 0.6% 32.09 GB 0.7%
4 Netflix Video 4.21 GB 0.1% 32.09 GB 0.7%
5 Non-web TCP — 454.98 GB 9.6% 454.98 GB 9.6%
6 Miscellaneous web — 307.19 GB 6.5% 307.19 GB 6.5%

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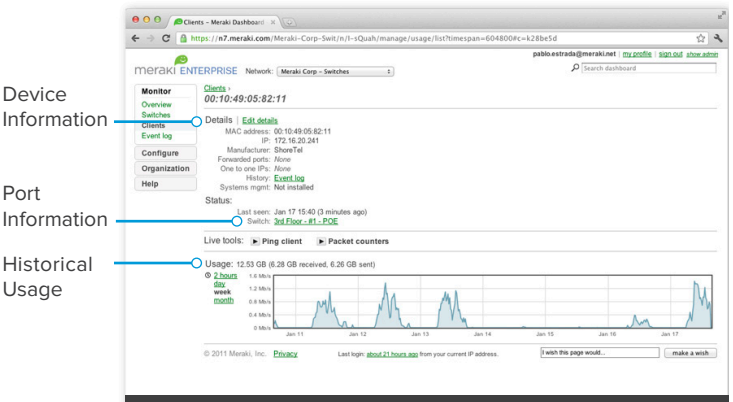
Cable test

Warning: this test will disrupt traffic to 100 or 10 Mbit devices.

Ports (eg. 1 or 1,2,3 or 1 - 3): 5-8 ▶

Port ▲	Link speed	Length	Status	Pair 1	Pair 2	Pair 3	Pair 4
5	down	33 m	-	open	open	open	open
6	100fdx	36 m	OK	ok	ok	abnorm	abnorm
7	100fdx	72 m	OK	ok	ok	short	short
8	100fdx	27 m	OK	ok	ok	abnorm	ok

Integrated Remote, Live Tools



Detailed Views of Individual Devices

Converged Voice, Video and Data Environments

The Meraki switch family is designed to unify data, voice, and video onto a single IP backbone. All Meraki switches support rich quality-of-service (QoS) functionality for prioritizing data, voice, and video traffic. The switches support eight class-of-service (CoS) queues on every port, enabling them to maintain end-to-end traffic prioritization.

PoE models provide 15.4 watts of power per port for VoIP telephones, IP security cameras, wireless access points (APs), and other IP devices. The Meraki MS switches also support standards-based 25.5 watt (30 watt max per port) IEEE 802.3at for powering networked devices like multiple radio IEEE 802.11n APs and video phones that may require more power than available with IEEE 802.3af. In addition, using LLDP, PoE power is intelligently budgeted to maximize the number of PoE clients supported.

To ease deployment, Meraki switches support the industry-standard Link Layer Discovery Protocol (LLDP), enabling switches to automatically discover Ethernet-enabled devices, determine their power requirements and join the correct virtual LAN (VLAN).

Meraki's Unified Software Architecture

Meraki switches run the same Meraki operating system used by Meraki's firewalls and wireless LAN products. The use of a common operating system allows Meraki to deliver a consistent experience across all product lines.

Layer 3

Cisco Meraki MS320 series switches augment security and performance with built-in layer 3 benefits. Large network deployments can create scalable network architectures and manage routing between VLANs through Meraki's intuitive, web-based dashboard.

Name	Subnet	VLAN	Interfaces
Infrastructure	10.13.0.0/20	13	Eng copper Distribution
Guest	10.12.0.0/24	12	Eng copper Distribution
Eng network	10.4.0.0/20	4	Eng copper Distribution
Marketing	10.20.0.0/20	20	Eng copper Distribution
HR	10.3.0.0/20	3	Eng copper Distribution

Subnet	Next hop	Switches
10.1.58.219/32	10.3.13.243	Eng copper Distribution (new) ×
192.150.1.0/24	10.3.10.239	Eng copper Distribution (new) ×
192.123.24.0/24	10.3.15.229	Eng copper Distribution (new) ×

Add a static route to all acting layer 3 switches

Specifying Layer 3 subnets and routes

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Designed for Reliability & Environmental Efficiency

The Meraki switch family was designed for reliable, long-lived operation in wiring closet environments, which may be prone to high temperatures and limited ventilation. By minimizing total component count and only using proven switching silicon, Meraki is able to deliver mean time between failure (MTBF) ratings of over 750,000 hours on products such as the Meraki MS220-8.

Each Meraki switch also operates with a split-plane architecture, where silicon-based switching and data forwarding are separated from software-based control and management. By decoupling the underlying switching logic from control, each unit is able to deliver wire-speed switching even when advanced software features such as Layer 7 host and OS fingerprinting are enabled.

Finally, the highly integrated designs of Meraki switches result in power and cooling savings in large deployment environments of 30-60% when compared with similar managed Gigabit switches.

Distributed Branches & Remote Sites

Meraki's cloud-based system makes it easy to manage a single switch, or thousands of distributed switches, from a single interface.

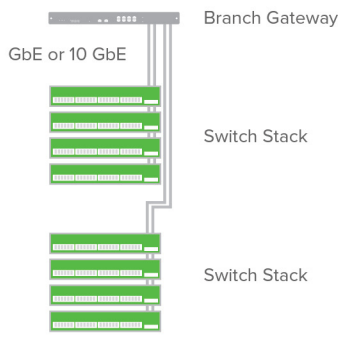
- Troubleshoot problems remotely, e.g., find which port has a bad cable attached.
- Add or replace switches without having to send a technician onsite. Switches automatically download their current configuration as soon as they are connected to the network.
- Receive email alerts or SMS messages whenever there's a problem at a remote site.[1]

Campus Edge

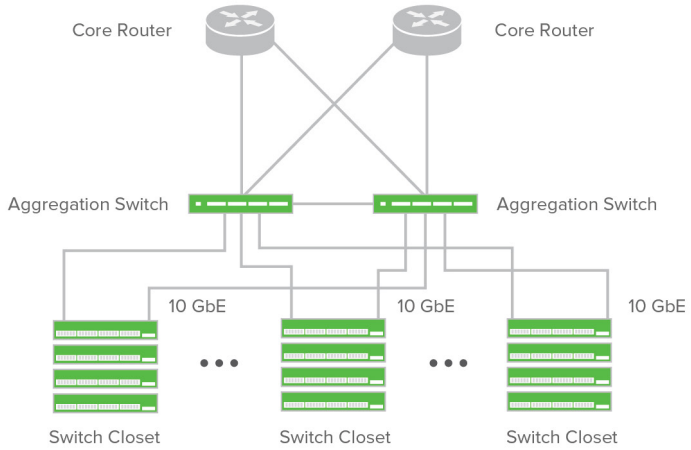
MS switches are ideal for small and large scale campus deployments, where reliability, scalability, and managability are top priorities.

- Virtual Stacking lets administators manage up to tens of thousands of ports in a single interface without having to physically connect stack members.
- 10GbE cable SFP+ ports with link aggregation provide high speed connectivity to aggregation switches such as the MS420.
- Get alerts when any switch fails or goes offline, before users complain.

Branch Office



Large Campus



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Accessories / Optics

The Meraki MS support pluggable optics for high-speed connectivity. Meraki offers several standards-based Gigabit and 10 Gigabit pluggable modules.

Supported Meraki accessory modules for MS Switches (no lock-out of third-party optics):

Model	Description	Standard	Range	Compatibility
MA-SFP-1GB-TX[1]	Meraki 1GbE Module for Category 5 Copper Wire, RJ-45	1000BASE-T	100m	MS220/320/420 Family
MA-SFP-1GB-SX	Meraki 1 GbE SFP SX Multi-Mode Fiber Module	1000BASE-SX	550m	MS220/320/420 Family
MA-SFP-1GB-LX10	Meraki 1 GbE SFP LX10 Single-Mode Fiber Module	1000BASE-LX10	10km	MS220/320/420 Family
MA-SFP-10GB-SR	Meraki 10 GbE SFP+ SR Multi-Mode Fiber Module	10GBASE-SR	400m	MS320/420 Family
MA-SFP-10GB-LRM	Meraki 10GbE SFP+ LRM Multi-Mode Fiber Module	10GBASE-LRM	220m	MS320/420 Family
MA-SFP-10GB-LR	Meraki 10 GbE SFP+ LR Single-Mode Fiber Module	10GBASE-LR	10km	MS320/420 Family
MA-CBL-TA-1M	Meraki 10 GbE Twinax Cable with SFP+ Connectors	10GSFP+Cu	1m	MS320/420 Family

[1]Available Jan 2014

Note: Meraki SFPs use LC connectors. Meraki does not guarantee third-party optic and support.

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Power Options

Back end of MS320-24P shown, highlighting redundant power supplies.

MS220 FAMILY

Model	Description	Available PoE/ PoE+ Power	Default Power Supply	Optional Redundant Power Supply
MS220-8-HW	Cloud-Managed L2 8 Port Gigabit Switch	–	Internal	–
MS220-8P-HW	Cloud-Managed L2 8 Port Gigabit 124W PoE Switch	124W	Internal	–
MS220-24-HW	Cloud-Managed L2 24 Port Gigabit Switch	–	Internal	External Redundant Power Option
MS220-24P-HW	Cloud-Managed L2 24 Port Gigabit 370W PoE Switch	370 W	Internal	External Redundant Power Option
MS220-48-HW	Cloud-Managed L2 48 Port Gigabit Switch	–	Internal	External Redundant Power Option
MS220-48LP-HW	Cloud-Managed L2 48 Port Gigabit 370W PoE Switch	370 W	Internal	External Redundant Power Option
MS220-48FP-HW	Cloud-Managed L2 48 Port Gigabit 740W PoE Switch	740 W	Internal	External Redundant Power Option

MS320 FAMILY

Model	Description	Available PoE/ PoE+ Power	Default Power Supply	Optional Redundant Power Supply
MS320-24-HW	Cloud-Managed L3 24 Port Gigabit Switch	–	PWR-MS320-250WAC	PWR-MS320-250WAC
MS320-24P-HW	Cloud-Managed L3 24 Port Gigabit 370W PoE Switch	370W	PWR-MS320-640WAC	PWR-MS320-640WAC
MS320-48-HW	Cloud-Managed L3 48 Port Gigabit Switch	–	PWR-MS320-250WAC	PWR-MS320-250WAC
MS320-48LP-HW	Cloud-Managed L3 48 Port Gigabit 370W PoE Switch	370 W	PWR-MS320-640WAC	PWR-MS320-640WAC
MS320-48FP-HW	Cloud-Managed L3 48 Port Gigabit 740W PoE Switch	740 W	PWR-MS320-1025WAC	PWR-MS320-1025WAC

Ordering Information: Software Licenses and Support

MS220 FAMILY

Model	1 Year	3 Years	5 Years	7 Years	10 Years
MS220-8	LIC-MS220-8-1YR	LIC-MS220-8-3YR	LIC-MS220-8-5YR	LIC-MS220-8-7YR	LIC-MS220-8-10YR
MS220-8P	LIC-MS220-8P-1YR	LIC-MS220-8P-3YR	LIC-MS220-8P-5YR	LIC-MS220-8P-7YR	LIC-MS220-8P-10YR
MS220-24	LIC-MS-220-24-1YR	LIC-MS-220-24-3YR	LIC-MS-220-24-5YR	LIC-MS-220-24-7YR	LIC-MS-220-24-10YR
MS220-24P	LIC-MS220-24P-1YR	LIC-MS220-24P-3YR	LIC-MS220-24P-5YR	LIC-MS220-24P-7YR	LIC-MS220-24P-10Y
MS220-48	LIC-MS220-48-1YR	LIC-MS220-48-3YR	LIC-MS220-48-5YR	LIC-MS220-48-7YR	LIC-MS220-48-10YR
MS220-48LP	LIC-MS220-48LP-1YR	LIC-MS220-48LP-3YR	LIC-MS220-48LP-5YR	LIC-MS220-48LP-7YR	LIC-MS220-48LP-10Y
MS220-48FP	LIC-MS220-48FP-1YR	LIC-MS220-48FP-3YR	LIC-MS220-48FP-5YR	LIC-MS220-48FP-7YR	LIC-MS220-48FP-10Y

MS320 FAMILY

Model	1 Year	3 Years	5 Years	7 Years	10 Years
MS320-24	LIC-MS320-24-1YR	LIC-MS320-24-3YR	LIC-MS320-24-5YR	LIC-MS320-24-7YR	LIC-MS320-24-10YR
MS320-24P	LIC-MS320-24P-1YR	LIC-MS320-24P-3YR	LIC-MS320-24P-5YR	LIC-MS320-24P-7YR	LIC-MS320-24P-10YR
MS320-48	LIC-MS320-48-1YR	LIC-MS320-48-3YR	LIC-MS320-48-5YR	LIC-MS-320-48-7YR	LIC-MS-320-48-10YR
MS320-48LP	LIC-MS320-48LP-1YR	LIC-MS320-48LP-3YR	LIC-MS320-48LP-5YR	LIC-MS320-48LP-7YR	LIC-MS320-48LP-10Y
MS320-48FP	LIC-MS320-48FP-1YR	LIC-MS320-48FP-3YR	LIC-MS320-48FP-5YR	LIC-MS320-48FP-7YR	LIC-MS320-48FP-10Y

Lifetime Warranty with Next-day Advanced Replacement

Meraki MS switches include a limited lifetime hardware warranty that provides next-day advance hardware switch replacement as long as the original purchaser owns the product. Meraki's simplified software and support licensing model also combines all software upgrades, centralized systems management and phone support under a single, easy-to-understand model.

For complete details, please **visit meraki.cisco.com/support**

Specifications

Management
Managed via the Web via the Meraki cloud management platform
Integrated with Meraki wireless, security appliance, and device management
Zero-touch remote deployment (no staging needed)
Detailed historical per-port and per-client usage statistics
DHCP, client, and hostname fingerprinting
SNMPD allows integration with third party network management solutions
Automatic firmware upgrades

Remote Diagnostics
Email and SMS (text) alerts [1]
Cable testing
Live remote packet capture
Aggregated event and configuration change logs with instant search

Scalable Stacking
Unified configuration and monitoring of all switches
Virtually Stacking supports thousands of switch ports in a single logical stack for unified management, monitoring, and configuration

Ethernet Switching Capabilities
802.1p Quality of Service prioritization
802.1Q VLAN tagging for up to 4,095 VLANs
802.1D Spanning Tree Protocol (STP) and 802.1w Rapid Spanning Tree
Broadcast storm control
802.1ab Link Layer Discovery Protocol (LLDP)
802.3ad Link aggregation with up to 8 ports per aggregate
Port mirroring
IGMP snooping for multicast filtering
MAC forwarding entries: MS220-8/24: 8,000, MS220-48: 16,000, MS320 family: 32,000 (applies to PoE and non-PoE models).

Security
Integrated two-factor authentication
Role-based administration
Corporate wide password policy enforcement
IEEE 802.1X port-based security
MAC-based RADIUS authentication
MAC whitelisting
BPDU guard
Root guard

[1] Requires carrier-supported email to SMS gateway. For more information visit: http://bit.ly/LIkOSQ.

[2] OSPF v2 expected Q2CY14.

Performance
Non-blocking fabric
2.5 microsecond latency
Jumbo frame support (9600 byte Ethernet frame)

Layer 3 (MS320 series)
Static routing[2]
DHCP Helper

Power
Power input: 100 - 240 VAC, 47-63 Hz
Power consumption: 5-885W

Mounting
Rack-mountable with included rack mount hardware (except MS220-8/P)
Desktop-mountable with included feet
Wall-mountable on MS220-8/P
Kensington lock on MS220-8/P

Environment
Operating temperature: 32 °F to 104 °F (0 °C to 40 °C)
Humidity: 5 to 95% non-condensing
Low acoustic noise for office environments; fanless for MS220-8/P and MS220-24

Regulatory
CSA (US)
IC (Canada)
CE (Europe)
C-Tick (Australia/New Zealand)
RoHS

Warranty
Full lifetime hardware warranty with next-day advanced replacement included

MS220 FAMILY

Model	MTBF
MS220-8	756,000
MS220-8P	421,000
MS220-24	541,400
MS220-24P	329,440
MS220-48	329,440
MS220-48LP	329,440
MS220-48FP	329,440

MS320 FAMILY

Model	MTBF
MS320-24	490,820
MS320-24P	474,570
MS320-48	291,960
MS320-48LP	282,970
MS220-48FP	282,970

MS220 FAMILY

Model	Physical Dimensions	Interface	Idle/Full Load Power (W)	Switching Capacity
220-8	WEIGHT: 2.37 lb. (1.08 kg) SIZE: 9.06” (w) x 8.66” (l) x 1.79” (h) (23 x 22 x 4.54 cm)	• 8x 10/100/1000BASE-T Ethernet RJ45 • 2x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	5/10	20 Gbps
220-8P	WEIGHT: 2.97 lb. (1.35 kg) SIZE: 9.06” (w) x 8.66” (l) x 1.79” (h) (23 x 22 x 4.44 cm)	• 8x 10/100/1000BASE-T Ethernet RJ45 • 2x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	13/159	20 Gbps
220-24	WEIGHT: 5.97 lb. (2.71 kg) SIZE: 19.08” (w) x 10.12” (l) x 1.75” (h) (48.46 x 25.7 x 4.4 cm)	• 24 x 10/100/1000BASE-T Ethernet RJ45 (4 shared with SFP) • 4x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	9/18	48 Gbps
220-24P	WEIGHT: 8.6 lb. (3.9 kg) SIZE: 19.08” (w) x 10.12” (l) x 1.75” (h) (48.46 x 25.7 x 4.4 cm)	• 24x 10/100/1000BASE-T Ethernet RJ45 (4 shared with SFP) • 4x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	30/447	48 Gbps
220-48	WEIGHT: 8.47 lb. (3.84 kg) SIZE: 19.08” (w) x 14.17” (l) x 1.75” (h) (48.46 x 36 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	28/51	104 Gbps
220-48LP	WEIGHT: 10.88 lb. (4.94 kg) SIZE: 19.08” (w) x 14.17” (l) x 1.75” (h) (48.46 x 36 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	45/505	104 Gbps
220-48FP	WEIGHT: 10.9 lb. (4.95 kg) SIZE: 19.08” (w) x 14.17” (l) x 1.75” (h) (48.46 x 36 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP for 1GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	49/903	104 Gbps

MS320 FAMILY

Model	Physical Dimensions	Interface	Idle/Full Load Power (W)	Switching Capacity
320-24	WEIGHT: 8.22 lb. (3.73 kg) SIZE_ 19.08” (w) x 17.32” (l) x 1.75” (h) (48.46 x 44 x 4.44 cm)	• 24x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP+ for 10GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	24/39	128 Gbps
320-24P	WEIGHT: 8.93 lb. (4.05 kg) SIZE: 19.08” (w) x 17.32” (l) x 1.75” (h) (48.46 x 44 x 4.44 cm)	• 24x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP+ for 10GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	32/454	128 Gbps
320-48	WEIGHT: 8.92 lb. (4.04 kg) SIZE: 19.08” (w) x 17.32” (l) x 1.75” (h) (48.46 x 44 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP+ for 10GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	34/55	176 Gbps
320-48LP	WEIGHT: 9.7 lb. (4.4 kg) SIZE: 19.08” (w) x 17.32” (l) x 1.75” (h) (48.46 x 44 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP+ for 10GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	46/480	176 Gbps
320-48FP	WEIGHT: 9.7 lb. (4.4 kg) SIZE: 19.08” (w) x 17.32” (l) x 1.75” (h) (48.46 x 44 x 4.44 cm)	• 48x 10/100/1000BASE-T Ethernet RJ45 • 4x SFP+ for 10GbE uplink • Auto negotiation and crossover detection (auto-MDIX crossover)	52/885	176 Gbps